Identification of cholinergic synaptic transmission in the insect nervous system

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Résumé en anglais	A major criteria initially used to localize cholinergic neuronal elements in nervous systems tissues that involve acetylcholine (ACh) as neurotransmitter is mainly based on immunochemical studies using choline acetyltransferase (ChAT), an enzyme which catalyzes ACh biosynthesis and the ACh degradative enzyme named acetylcholinesterase (AChE). Immunochemical studies using anti-ChAT monoclonal antibody have allowed the identification of neuronal processes and few types of cell somata that contain ChAT protein. In situ hybridization using cRNA probes to ChAT or AChE messenger RNA have brought new approaches to further identify cell bodies transcribing the ChAT or AChE genes. Combined application of all these techniques reveals a widespread expression of ChAT and AChE activities in the insect central nervous system and peripheral sensory neurons which implicates ACh as a key neurotransmitter. The discovery of the snake toxin alpha-bungatoxin has helped to identify nicotinic acetylcholine receptors (nAChRs). In fact, nicotine when applied to insect neurons, resulted in the generation of an inward current through the activation of nicotinic receptors which were blocked by alpha-bungarotoxin. Thus, insect nAChRs have been divided into two categories, sensitive and insensitive to this snake toxin. Up to now, the recent characterization and distribution pattern of insect nAChR subunits and the biochemical evidence that the insect central nervous system contains different classes of cholinergic receptors indicated that ACh is involved in several sensory pathways.
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